National Park Service Inventory and Monitoring Program South Florida / Caribbean Network

Vital Signs



The NPS South Florida / Caribbean Network will be meeting with potential partners and holding workshops to determine monitoring strategies for 41 Vital Signs.

What are Vital Signs?

"Vital Signs" are physical, chemical, and biological elements and processes of park ecosystems that represent the overall health or condition of the park; they may also be park resources that are highly valued but not necessarily indicative of general park health.



were uploaded into an online database where they were ranked by 102 people. Participants included area scientists, agency staff, NPS staff, and non-NPS natural resource managers. The prioritized list of indicators was presented to park superintendents and resource managers in May, 2006. The 62 indicators were then consolidated into 41 general "Vital Signs" (see Table 1).

What is the NPS Inventory & Monitoring

Program? The South Florida / Caribbean Network (SFCN) is one of 32 NPS Inventory and Monitoring Program networks and has the responsibility for selecting "Vital Signs", and developing monitoring programs or coordinating with existing monitoring programs to effectively report the status, changes, and early warning of trends in these vital signs, for the purpose of assisting adaptive management of park resources.

Vital signs will be reported to park management staff, U.S. Congress, area scientists, and the public.

The South Florida / Caribbean Network includes:

- Big Cypress National Preserve (BICY)
- Biscayne National Park (BISC)
- Buck Island Reef National Monument (BUIS)
- Dry Tortugas National Park (DRTO)
- Everglades National Park (EVER)
- Salt River Bay National Historic Park and Ecological Preserve (SARI)
- Virgin Islands National Park (VIIS)

How were vital signs identified and prioritized?

The SFCN held three Vital Signs Indicator Development Workshops in Jan.-Mar. 2006 with a total of 70 participants who reviewed network conceptual models, developed potential indicators and filled out indicator worksheets. The worksheets

How will SFCN design its monitoring program?

The SFCN is looking for:

- Opportunities to collaborate (e.g. CERP, park monitoring, NOAA, CWCS)
- Opportunities where co-location or other techniques can reduce costs
- Suites of indicators that when monitored together synergistically add value by describing system condition more completely, even though some individually may have ranked lower

This is expected to involve meetings/workshops with local experts on the selected vital signs. Funding constraints will allow SFCN to monitor only some of the 41 Vital Signs.

By December 2007, NPS-SFCN staff will produce a "Vital Signs Monitoring Plan" that includes its overall monitoring strategy, sampling design, protocols selected and/or planned development, databases, staffing, budget, analysis and reporting for the Vital Signs to be monitored.

Where can I get more information?

(305) 252-0347, Matt_Patterson@nps.gov http://www1.nature.nps.gov/im/units/sfcn/ http://www1.nature.nps.gov/im/units/sfcn/vsmp.htm

Table 1. SFCN Vital Signs linked with workshop indicators. SFCN Vital Signs are shown within the National Framework (Level 1, 2, and 3) and linked with the indicators identified in workshops in January - March 2006 and ranked via an online ranking process. The workshop indicators were lumped into more general "Vital Signs" which are more consistent in organization and level of detail with other NPS Inventory and Monitoring Program Network Vital Signs. However, the workshop indicator details will help guide the program. The priority rank for each indicator is also given (1 is highest).

Coestal Coes	Nationa	II & M Progra	m Framework			Priority
Solls Ology Oceanographic Features and Processes Stream/River Channel Characteristics Stream of domes Stream of domes Characteristics Stream of chara	Level 1			SFCN Vital Sign	SFCN Workshop Indicators	_
Oceangraphic Features and Processes Position and Spatial Extent of Mud Banks, Buttonwood Embankment and Berms Position and Spatial Extent of Mud Banks, Buttonwood Embankment and Berms Stream/River Channel Characteristics Characteristics Characteristics Surface Water Spatial and temporal changes in extent and distribution of substrate type (marl vs. peat), Long-term sediment elevation changes in cypress strands and domes Salt and temporal changes in extent and distribution of substrate type (marl vs. peat), Long-term sediment elevation changes in cypress strands and domes Salt and temporal saltenty experts Position Substrate type (marl vs. peat), Salt and temporal saltenty patterns Proceedings Procedings Proceedings Proceedings Procedings Procedings Procedings Proceedings Proceedings Proceedings Procedings Procedings Procedings Procedings Procedings Procedings Procedings				Coastal Geomorphology		34
Processes Embankment and Berms 46	Soils	ology				34
Procession Pro						46
Charnel Characteristics Water Water Water Water Quality Water Quality Water Chemistry Nutrient Dynamics Water Quality Water Quality Water Chemistry Nutrient Dynamics Water Quality Water Quality Water Chemistry Nutrient Dynamics Water Quality Water Chemistry Nutrient Dynamics Water Quality Water Quality Water Chemistry Nutrient Dynamics Water Quality Water Chemistry Nutrient Dynamics Nutrient Dynamics Vater Quality Water Quality Water Quality Nutrient Dynamics Nutrient Dynamics Nutrient Dynamics Vater Quality Nutrient Dynamics Nutrient Dynamics Vater Quality Nutrient Dynamics Nutrient Dynamics Toxics Contaminants Contaminants in water column, organisms, and sediments. Aquatic Macroinvertebrate Macroinvertebrate Periphyton (Freshwater) Phytoplankton composition and biomass for Phytoplankton Composition Invasive Exotic Plants Invasive Exotic Plants Invasive Exotic Animals Invasive Exotic fauna Early detection, status, and trends of non-indigenous aquatic species. Focal Species Oramunities Focal Species Oramunities Watine Watine Communities Marine Benthic Communities Mangrove-Marsh Ecotone Communities Mangrove-Marsh Ecotone Communities Mangrove-Marsh Ecotones Question of critical ecotones - field plots/transects Communities Forest Woodland Community Structure Community Structure Community Structure Community Structure Marine Marine Marine Exploited Invertebrates Marine Exploited Invertebrates Marine Exploited Invertebrates Marine Infaunal Community Invertebrates Marine Infaunal Community Invertebrates in with Invertebrates in wi						10
Mater Hydrology Surface Water Dynamics Surface Water Hydrology Hydrology = water stage, flow, timing, and duration. 3 7 7 8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				Wetland substrate		51
Hydrology Surface Water Dynamics Surface Water Hydrology Hydrology = water stage, flow, timing, and duration. 3 7 7 7 7 7 7 7 7 7			Characteristics			58
Water Quality Water Quality Water Characteristics Water Quality Water Characteristics Water Quality Water Characteristics Nutrient Dynamics Special and Temporal Salinity Patterns Nutrient Loading Aquatic Macroinvertebrate Macroinvertebrate Phytoplankton (Marine) Periphyton (Freshwater) Phytoplankton (Marine) Phytoplankton (Marine) Phytoplankton Composition and biomass Plants Invasive/Exotic Plants Invasive/Exotic Plants Plants Invasive/Exotic Animals Narine Benthic Communities Focal Species Marine Communities Marine Benthic Communities Marine Benthic Communities Marine Communities Mangrove-Marsh Ecotone Communities Wetland Communities Wetland Communities Wetland Communities Forest/Woodland Communities Marine Marine Exploited Invertebrates Marine Invertebrates Marine Invertebrates Marine Exploited Invertebrates Marine Infaunal Community Physical drivers of mangrove-marsh acotone Coysters, Aerial photography Physical drivers of mangrove-marsh acotone Community Structure Community Structure Marine Infaunal Community Pink Shrimp population structure, status, and trends Aquatic invertebrates in wet Inverteb	Water	Hydrology	Surface Water	Surface Water Hydrology	Hydrology = water stage, flow, timing, and duration.	3
Nutrient Dynamics Nutrient Dynamics Surface Water Quality - physiochemical surface water characteristics at specific locations 12			Dynamics			7
Nutrient Dynamics Nutrient Dynamics Surface Water Quality- physiochemical surface water characteristics at specific locations Swater Quality- Nutrients characteristics of the marine water bodies Nutrient Loading and Sediment Loading 18		Water Quality	Water Chemistry	Estuarine salinity patterns	Spatial and Temporal Salinity Patterns	11
Provided					Surface Water Quality- physiochemical surface water	12
Toxics Contaminants Contaminants in water column, organisms, and sediments. 25 Aquatic Macroinvertebrate Macroinvertebrate Invasive/Exotic Plants Invasive/Exotic Plants Invasive/Exotic Animals Focal Species Plants Invasive/Exotic Animals Focal Species Marine Communities Forest Marine Communities Invasive/Exotic Animals Intertidal Communities Mangrove-Marsh Ecotone Communities Forest Marine Communities Wetland Communities Wetland Communities Forest/Woodland Communities Forest/Woodland Communities Marine Infaunal Community Structure Invertebrates Marine Infaunal Community Marine Infaunal Community Marine Infaunal Community Freshwater Invertebrates Terrestrial Invertebrates Terrestrial Invertebrates Terrestrial Invertebrates Butterflies Contaminants in water column, organisms, and sediments. 22 Periphyton Phytoplankton (Marine) Phytoplankton composition and biomass 50 Phytoplankton composition and biomass 50 Phytoplankton (Marine) Phytoplankton composition and biomass 50 Phytoplankton (Marine) Phytoplankton composition and biomass 50 Phytoplankton (Marine) Phytoplankton (Marine) Phytoplankton (Marine) Phytoplankton composition and biomass 50 Phytoplankton (Marine) Phytoplankton (Marine) Phytoplankton (Darins) Phytoplankton (Darins) Nevotic plants Invasive exotic plants Invasive exotic plants Invasive exotic fauna Invasive exot					Water Quality- Nutrients characteristics of the marine	5
Toxics Contaminants Contaminants in water column, organisms, and sediments. 25 Aquatic Macroinvertebrate Macroinvertebrate Invasive/Exotic Plants Invasive/Exotic Plants Invasive/Exotic Animals Focal Species Plants Invasive/Exotic Animals Focal Species Marine Communities Forest Marine Communities Invasive/Exotic Animals Intertidal Communities Mangrove-Marsh Ecotone Communities Forest Marine Communities Wetland Communities Wetland Communities Forest/Woodland Communities Forest/Woodland Communities Marine Infaunal Community Structure Invertebrates Marine Infaunal Community Marine Infaunal Community Marine Infaunal Community Freshwater Invertebrates Terrestrial Invertebrates Terrestrial Invertebrates Terrestrial Invertebrates Butterflies Contaminants in water column, organisms, and sediments. 22 Periphyton Phytoplankton (Marine) Phytoplankton composition and biomass 50 Phytoplankton composition and biomass 50 Phytoplankton (Marine) Phytoplankton composition and biomass 50 Phytoplankton (Marine) Phytoplankton composition and biomass 50 Phytoplankton (Marine) Phytoplankton (Marine) Phytoplankton (Marine) Phytoplankton composition and biomass 50 Phytoplankton (Marine) Phytoplankton (Marine) Phytoplankton (Darins) Phytoplankton (Darins) Nevotic plants Invasive exotic plants Invasive exotic plants Invasive exotic fauna Invasive exot					Nutrient Loading and Sediment Loading	18
Macroinvertebrate Phytoplankton (Marine) Phytoplankton composition and biomass 50			Toxics	Contaminants		25
Macroinvertebrate Phytoplankton (Marine) Phytoplankton composition and biomass 50			Aquatic	Periphyton (Freshwater)	Periphyton	23
Invasive Plants			· ·			-
Invasive/Exotic Animals Invasive/Exotic Animals Invasive/Exotic Animals Invasive/Exotic Animals Invasive/Exotic Animals Focal Species or Communities Intertidal Communities Wetland Communities Wetland Communities Wetland Communities Forest/Woodland Communities Forest/Woodland Communities Marine Invertebrates Marine Invertebrates Marine Infaunal Community Infaunal Denthic Coral Community Structure Infaunal Community Structure, status, and trends Aquatic species. Coral Communities Coral Communities Coral Communities Coral Communities Coral Communities Coral Communities Auditic species. Coral Communities Coral Communities Acquatic species. Coral Communities Coral Communities Acquatic species. Coral Community Acquatic species. Acquatic	Biological Integrity					6
Focal Species or Communities Marine Benthic Communities Communities Mangrove-Marsh Ecotone Communities Mangrove-Marsh Ecotone Communities Metland Communities Wetland Communities Communities Metland Communities Forest/Woodland Communities Forest/Woodland Communities Marine Invertebrates Marine Invertebrates Marine Infaunal Community Marine Infaunal Community Marine Invertebrates Freshwater Invertebrates Freshwater Invertebrates Terrestrial Invertebrates Marine Benthic Corad Community Structure Seagrass and other SAV cover and community of composition Location of critical ecotones - field plots/transects Location of critical ecotones - field plots/transects Location of critical ecotones - field plots/transects Long-term, within-community vegetation shifts using permanent plots Exploited Invertes (Lobster, Conch, Crabs, Shrimp, Stone Crab, Blue Crab, Clams, Oysters, Sponges, Whelks) Pink Shrimp population structure, status, and trends 40 Oyster population structure, status, and trends 41 Freshwater Invertebrates Freshwater Invertebrates Freshwater Invertebrates Butterflies Butterflies Butterflies Butterflies Butterflies Butterflies Aquatic invertebrates in wet prairies and marshes 61	3 7			Invasive/Exotic Animals	Invasive exotic fauna	17
Focal Species or Communities Narine					_ ·	20
Communities Communities Communities Communities Communities Intertidal Communities Intertidal Communities Mangrove-Marsh Ecotone Wetland Communities Communities Wetland Communities Forest/Woodland Communities Marine Invertebrates Freshwater Invertebrates Freshwater Invertebrates Ferestrial Invertebrates Terrestrial Invertebrates Communities Communities Communities Communities Communities Mangrove-Marsh Ecotone Location of critical ecotones - field plots/transects Long-term, within-community vegetation shifts using permanent plots Exploited Inverts (Lobster, Conch, Crabs, Shrimp, Stone Crab, Blue Crab, Clams, Oysters, Sponges, Whelks) Pink Shrimp population structure, status, and trends Oyster population structure, status, and trends Oyster population structure, status, and trends Apuatic invertebrates in wet prairies and marshes Apuatic invertebrates in wet prairies and marshes Marine Invertebrates Ferrestrial Invertebrates Butterflies Butterflies Butterflies Butterflies Ecotones - field plots/transects Location of critical ecotones - field plots/transects Ecotones - field plots/						
Intertidal Communities		or				1
Communities Communities Ecotion of critical ecotiones - field plots/transects 22						4
Metland Wetland Ecotones and Communities Community Structure Location of critical ecotones - field plots/transects 22				Mangrove-Marsh Ecotone	Location of critical ecotones - field plots/transects	22
Wetland CommunitiesWetland Ecotones and Community StructureLocation of critical ecotones - field plots/transects22Forest/Woodland CommunitiesForest Ecotones and Community StructureLocation of critical ecotones - field plots/transects22Marine 						33
Communities Community Structure Forest/Woodland Communities Forest Ecotones and Community Structure Location of critical ecotones - field plots/transects Location of critical ecotones - field plots/transects Location of critical ecotones - field plots/transects Long-term, within-community vegetation shifts using permanent plots Marine Invertebrates Marine Exploited Invertebrates Marine Infaunal Community Infaunal benthic community structure and abundance for animals Freshwater Invertebrates Aquatic invertebrates in wet prairies and marshes Terrestrial Invertebrates Butterflies Location of critical ecotones - field plots/transects 22 Long-term, within-community vegetation shifts using permanent plots Exploited Inverts (Lobster, Conch, Crabs, Shrimp, Stone Crab, Blue Crab, Clams, Oysters, Sponges, Whelks) 13 Fink Shrimp population structure, status, and trends Oyster population structure, status, and trends Infaunal benthic community structure and abundance for animals Aquatic invertebrates in wet prairies and marshes 41 Butterflies Butterflies Butterflies 61					Physical drivers of mangrove-marsh ecotone	36
Forest/Woodland Communities Forest Ecotones and Community Structure Location of critical ecotones - field plots/transects Long-term, within-community vegetation shifts using permanent plots Marine Invertebrates Marine Exploited Inverte (Lobster, Conch, Crabs, Shrimp, Stone Crab, Blue Crab, Clams, Oysters, Sponges, Whelks) Pink Shrimp population structure, status, and trends Oyster population structure, status, and trends Oyster population structure and abundance for animals Freshwater Invertebrates Invertebrates Terrestrial Invertebrates Butterflies Butterflies Butterflies Location of critical ecotones - field plots/transects 22 Long-term, within-community vegetation shifts using permanent plots Exploited Inverts (Lobster, Conch, Crabs, Shrimp, Stone Crab, Blue Crab, Clams, Oysters, Sponges, Whelks) 13 Freshwater Invertebrates in foreign permanent plots Aquatic invertebrates in wet prairies and marshes Aquatic invertebrates in wet prairies and marshes 41 Butterflies Butterflies 61			Wetland	Wetland Ecotones and	Location of critical ecotones - field plots/transects	22
Communities Community Structure Community Structure Location of critical ecotones - field plots/fransects Long-term, within-community vegetation shifts using permanent plots Marine Invertebrates Marine Exploited Inverts (Lobster, Conch, Crabs, Shrimp, Stone Crab, Blue Crab, Clams, Oysters, Sponges, Whelks) Pink Shrimp population structure, status, and trends Oyster population structure, status, and trends Marine Infaunal Community Infaunal benthic community structure and abundance for animals Freshwater Invertebrates Invertebrates Terrestrial Invertebrates Butterflies Butterflies Location of critical ecotones - field plots/fransects 22 Long-term, within-community vegetation shifts using permanent plots Exploited Inverts (Lobster, Conch, Crabs, Shrimp, Stone Crab, Blue Crab, Clams, Oysters, Sponges, Whelks) 13 40 Oyster population structure, status, and trends 47 Aquatic invertebrates in wet prairies and marshes 41 Butterflies Butterflies 61			Communities	Community Structure		26
Long-term, within-community vegetation shifts using permanent plots Marine Invertebrates Invertebrates Marine Exploited Inverts (Lobster, Conch, Crabs, Shrimp, Stone Crab, Blue Crab, Clams, Oysters, Sponges, Whelks) Pink Shrimp population structure, status, and trends Oyster population structure, status, and trends Infaunal benthic community structure and abundance for animals Freshwater Invertebrates					Location of critical ecotones - field plots/transects	22
Invertebrates Invert						26
Oyster population structure, status, and trends Marine Infaunal Community Infaunal benthic community structure and abundance for animals Freshwater Invertebrates Terrestrial Invertebrates Butterflies Oyster population structure, status, and trends 47 Aquatic invertebrate in wet prairies and marshes 48 Aquatic invertebrates in wet prairies and marshes 49 Aquatic invertebrates in wet prairies and marshes 41 Aquatic invertebrates in wet prairies and marshes 42 Aquatic invertebrates in wet prairies and marshes 43 Aquatic invertebrates in wet prairies and marshes 44 Aquatic invertebrates in wet prairies and marshes 45 Aquatic invertebrates in wet prairies and marshes 46 Aquatic invertebrates in wet prairies and marshes 47 Aquatic invertebrates in wet prairies and marshes 48 Aquatic invertebrates in wet prairies and marshes 49 Aquatic invertebrates in wet prairies and marshes 40 Aquatic invertebrates in wet prairies and marshes 40 Aquatic invertebrates in wet prairies and marshes 41 Aquatic invertebrates in wet prairies and marshes 41 Aquatic invertebrates in wet prairies and marshes 42 Aquatic invertebrates in wet prairies and marshes 43 Aquatic invertebrates in wet prairies and marshes 44 Aquatic invertebrates in wet prairies and marshes 44 Aquatic invertebrates in wet prairies and marshes 45 Aquatic invertebrates in wet prairies and marshes 46 Aquatic invertebrates in wet prairies and marshes 47 Aquatic invertebrates in wet prairies and marshes 48 Aquatic invertebrates in wet prairies and marshes 49 Aquatic invertebrates in wet prairies and marshes 40 Aquatic invertebrates in wet prairies and marshes 40 Aquatic invertebrates in wet prairies and marshes 41 Aquatic invertebrates in wet prairies and marshes 41 Aquatic invertebrates in wet prairies and mar			Invertebrates	Invertebrates		13
Marine Infaunal Community Infaunal benthic community structure and abundance for animals Freshwater Invertebrates Invertebrates Terrestrial Invertebrates Invertebrates Marine Infaunal Community Infaunal benthic community structure and abundance for animals Aquatic invertebrates in wet prairies and marshes 41 Butterflies Butterflies Butterflies 61						
Freshwater Invertebrates Prairies & marshes Terrestrial Invertebrates Butterflies Aquatic invertebrates in wet prairies and marshes Aquatic invertebrates in wet prairies and marshes 41 Butterflies Butterflies Butterflies 61						47
Invertebrates prairies & marshes Terrestrial Invertebrates Butterflies Butterflies Aduatic invertebrates in wet prairies and marshes 41 Butterflies Butterflies 61				Marine Infaunal Community	· ·	53
Invertebrates Butterflies Butterflies 61					Aquatic invertebrates in wet prairies and marshes	41
Island Insects Island Insects 62				Butterflies	Butterflies	61
				Island Insects	Island Insects	62

Table1 (Continued). SFCN Vital Signs linked with workshop indicators.

Nationa	al I & M Progra	m Framework			Priority
Level 1	Level 2	Level 3	SFCN Vital Sign	SFCN Workshop Indicators	rank
Biological	Focal Species	Fishes (marine)	Marine Fish Communities		
Integrity (Continued)	or Communities (Continued)			Exploited Fish Assemblage - Grouper, Snapper, (parrotfish, surgeonfish in USVI)- population structure, status, and trends	2
				Marine Fish Communities - Coastal Shelf / Deep oceanic - Status, structure, trends	15
				Marine Fish Communities - Bays/Mangroves - Status, structure, trends	21
			Focal Sportfish communities	Goliath Grouper (Red Hind in VI) - population structure, status, and trends	38
				Bonnethead, Lemon, Bull, Nurse Sharks - population structure, status, trends	43
				Gray Snapper (Schoolmaster in VI)- population structure, status, & trends	45
				Spotted Sea Trout - population structure, status, and trends	48
		Fishes	For the second large	Snook - population structure, status, and trends	52
		Fishes (freshwater)	Freshwater fish and large macro-invertebrates	Freshwater fish and large macro-invertebrates in wet prairies and marshes	24
		Amphibians and	American Alligator	American alligator (Alligator mississippiensis)	29
		Reptiles	Amphibians	Amphibians - South Florida & USVI	32
				Pig Frog (Rana grylio)	54
			Reptiles-USVI	Reptiles - USVI	57
			Florida Box Turtle	Florida Box Turtle (Terrapene Carolina bauri)	59
		Birds	Colonial Nesting Birds	Wading birds - Regional South Florida - Systematic Reconnaissance Flights	10
				Colonial Nesting Birds (e.g. Least terns, pelicans, boobies, roseatte terns, egrets, storks, herons)	16
			Landbirds	Land Birds - residential and migratory	31
				Land birds - Mangrove - population abundance and distribution	42
				Landbirds - Pine Rockland - population abundance and distribution.	49
				Landbirds-Cavity-nesting pine rockland birds - Demographics (Fecundity and Survival)	55
		Mammals	Bats-USVI	Bats - USVI	60
	At-risk Biota	T&E Species and Communities	Marine Invertebrates-RTE	Marine Invertebrates - Rare, threatened, and endangered species - Acropora, Diadema, Antipathes	8
			Sea Turtles	Sea Turtles	27
			American crocodile	American crocodile (Crocodylus acutus)	28
			Protected Marine mammals	Marine Vertebrates - Rare, threatened, and endangered species - Crocodiles, Dolphin, Manatee, Sea Turtles, Protected marine mammals.	35
			Imperiled & Rare Plants	Critically Imperiled and Rare Plants	39
			Florida panther	Florida panther	44
			Sawfish	Sawfish- population structure, status, and trends	56
Human use	Visitor and Recreation Use	Visitor Use	Visitor Use	Visitor Use (Both commercial and individual/personal use)	19
Landscapes (Ecosystem	Fire and Fuel Dynamics	Fire and Fuel Dynamics	Fire Return Interval Departure	Fire Return Interval Departure	37
Pattern and Processes)	Landscape Dynamics	Land Cover and Use	Vegetation Communities Extent & Distribution	Shape, orientation, location, and coverage of vegetation community types	9
			Benthic Communities Extent & Distribution	Benthic community spatial & temporal changes in extent and distribution -remote sensing	30
			Land Use Change	Land Development inside/outside the park (within 5 mile radius for USVI parks, radius may be expanded to 75 miles in South Florida)	14